

DV Qualifiers
in database
-HR

checked by AT
2/3/17

CERTIFICATION

SDG No: MC49177 Laboratory: Accutest, Massachusetts
Site: BMS, Building 5 Area, PR Matrix: Groundwater
Humacao, PR

SUMMARY: Groundwater samples (Table 1) were collected on the BMSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were collected December 13 - 15, 2016 and were analyzed in Accutest Laboratory of Marlborough, Massachusetts that reported the data under SDG No.: MC49177. Results were validated using the following quality control criteria of the methods employed (MADEP VPH and MAPED EPH, Massachusetts Department of Environmental Protection, 2004) and the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49177-1	G-IR3	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-2	EB121416	AQ – Equipment Blank	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3	MW-21S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3D	MW-21S MSD	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-3S	MW-21S MS	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-4	FB121316	Field Blank Water	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-5	S-43S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-6	S-42S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-7	E-1R	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-8	D-1R	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-9	D-1R DUP	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-10	MW-13	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-11	MW-7	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
MC49177-12	FB121416	Field Blank Water	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-13	MW-22S	Groundwater	Volatiles TPHC Ranges Extractable TPHC Ranges
MC49177-14	EB121516	AQ – Equipment Blank	Volatiles TPHC Ranges Extractable TPHC Ranges

Reviewer Name: Rafael Infante
Chemist License 1888

Signature: Rafael Infante

Date: January 21, 2017



SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	G-1R3	Date Sampled:	12/13/16
Lab Sample ID:	MC49177-1	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP VPH REV 1.1		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78373.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2	WX78374.D	100	12/20/16	AF	n/a	n/a	GWX3883

Run #	Purge Volume
Run #1	5.0 ml
Run #2	5.0 ml

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	161	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	85000 ^a	5000	800	ug/l	
	C9- C10 Aromatics (Unadj.)	151	50	9.7	ug/l	
	C5- C8 Aliphatics	85.5	50	8.8	ug/l	
	C9- C12 Aliphatics	17800	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	95%	83%	70-130%
	2,3,4-Trifluorotoluene	105%	92%	70-130%

(a) Result is from Run# 2



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: G-1R3
 Lab Sample ID: MC49177-1
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16551.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16579.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	930 ml	2.0 ml
Run #2	930 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	49.8	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	71.8	110	29	ug/l	J
	C11-C22 Aromatics	48.8	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%	63%	40-140%
321-60-8	2-Fluorobiphenyl	99%	79%	40-140%
3386-33-2	1-Chlorooctadecane	35% ^b	33% ^b	40-140%
580-13-2	2-Bromonaphthalene	101%	80%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: EB121416
 Lab Sample ID: MC49177-2
 Matrix: AQ - Equipment Blank
 Method: MADEP VPH REV 1.1
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78387.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.1	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.5	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: EB121416
 Lab Sample ID: MC49177-2
 Matrix: AQ - Equipment Blank
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16552.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16580.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	880 ml	2.0 ml
Run #2	880 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	33	ug/l	
	C9-C18 Aliphatics	ND	110	19	ug/l	
	C19-C36 Aliphatics	ND	110	31	ug/l	
	C11-C22 Aromatics	ND	110	33	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	87%	85%	40-140%
321-60-8	2-Fluorobiphenyl	108%	104%	40-140%
3386-33-2	1-Chlorooctadecane	32% ^b	33% ^b	40-140%
580-13-2	2-Bromonaphthalene	110%	105%	40-140%

(a) Confirmation run.

(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-21S
 Lab Sample ID: MC49177-3
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78369.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	12.8	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.8	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	85%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-21S
 Lab Sample ID: MC49177-3
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16553.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16581.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	950 ml	2.0 ml
Run #2	950 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	41.1	110	30	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	40.4	110	30	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	77%	64%	40-140%
321-60-8	2-Fluorobiphenyl	97%	84%	40-140%
3386-33-2	1-Chlorooctadecane	26% ^b	29% ^b	40-140%
580-13-2	2-Bromonaphthalene	97%	85%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: FB121316
 Lab Sample ID: MC49177-4
 Matrix: AQ - Field Blank Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78388.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	9.2	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	12.8	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: FB121316
 Lab Sample ID: MC49177-4
 Matrix: AQ - Field Blank Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16554.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16582.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	900 ml	2.0 ml
Run #2	900 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	32	ug/l	
	C9-C18 Aliphatics	ND	110	19	ug/l	
	C19-C36 Aliphatics	ND	110	30	ug/l	
	C11-C22 Aromatics	ND	110	32	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	84%	70%	40-140%
321-60-8	2-Fluorobiphenyl	95%	81%	40-140%
3386-33-2	1-Chlorooctadecane	29% ^b	34% ^b	40-140%
580-13-2	2-Bromonaphthalene	96%	82%	40-140%

(a) Confirmation run.

(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: S-43S
 Lab Sample ID: MC49177-5
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78379.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	42.9	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	59.5	50	8.0	ug/l	B
	C9- C10 Aromatics (Unadj.)	29.7	50	9.7	ug/l	JB
	C5- C8 Aliphatics	31.4	50	8.8	ug/l	J
	C9- C12 Aliphatics	27.3	50	8.0	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: S-43S
 Lab Sample ID: MC49177-5
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16555.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16583.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	940 ml	2.0 ml
Run #2	940 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	80.6	110	30	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	77.7	110	30	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	89%	82%	40-140%
321-60-8	2-Fluorobiphenyl	93%	88%	40-140%
3386-33-2	1-Chlorooctadecane	38% ^b	38% ^b	40-140%
580-13-2	2-Bromonaphthalene	95%	89%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	S-42S	Date Sampled:	12/15/16
Lab Sample ID:	MC49177-6	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP VPH REV 1.1		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78380.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	15.8	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	14.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.9	50	9.7	ug/l	JB
	C5- C8 Aliphatics	15.3	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: S-42S
 Lab Sample ID: MC49177-6
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16556.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16584.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	930 ml	2.0 ml
Run #2	930 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	57.3	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	31.3	110	29	ug/l	J
	C11-C22 Aromatics	57.3	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	74%	69%	40-140%
321-60-8	2-Fluorobiphenyl	88%	84%	40-140%
3386-33-2	1-Chlorooctadecane	34% ^b	35% ^b	40-140%
580-13-2	2-Bromonaphthalene	89%	84%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: E-1R
 Lab Sample ID: MC49177-7
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78381.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	23.6	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	17.9	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.1	50	9.7	ug/l	JB
	C5- C8 Aliphatics	14.5	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	89%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	E-1R	Date Sampled:	12/13/16
Lab Sample ID:	MC49177-7	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP EPH REV 1.1 SW846 3510C		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16557.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16585.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

Run #	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	98.2	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	63.5	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	72%	77%	40-140%
321-60-8	2-Fluorobiphenyl	85%	94%	40-140%
3386-33-2	1-Chlorooctadecane	30% ^b	38% ^b	40-140%
580-13-2	2-Bromonaphthalene	86%	96%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: D-1R
 Lab Sample ID: MC49177-8
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78382.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	11.1	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	16.2	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	16.0	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	92%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: D-1R
 Lab Sample ID: MC49177-8
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/13/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16558.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16590.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	36.6	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	35.6	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%	69%	40-140%
321-60-8	2-Fluorobiphenyl	100%	80%	40-140%
3386-33-2	1-Chlorooctadecane	32% ^b	36% ^b	40-140%
580-13-2	2-Bromonaphthalene	102%	81%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	D-1R DUP	Date Sampled:	12/13/16
Lab Sample ID:	MC49177-9	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP VPH REV 1.1		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78383.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	50.2	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	13.8	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	15.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	45.5	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	94%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	D-1R DUP	Date Sampled:	12/13/16
Lab Sample ID:	MC49177-9	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP EPH REV 1.1 SW846 3510C		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16559.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16591.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

Run #	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2	980 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	38.7	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	37.7	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%	68%	40-140%
321-60-8	2-Fluorobiphenyl	97%	85%	40-140%
3386-33-2	1-Chlorooctadecane	34% ^b	27% ^b	40-140%
580-13-2	2-Bromonaphthalene	98%	86%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-13
 Lab Sample ID: MC49177-10
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78384.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	13.4	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-13
 Lab Sample ID: MC49177-10
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16560.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

Run #	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	39.3	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	38.9	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	93%		40-140%
321-60-8	2-Fluorobiphenyl	95%		40-140%
3386-33-2	1-Chlorooctadecane	41%		40-140%
580-13-2	2-Bromonaphthalene	97%		40-140%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	MW-7	Date Sampled:	12/14/16
Lab Sample ID:	MC49177-11	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP VPH REV 1.1		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78385.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	12.1	50	8.8	ug/l	J
	C9- C12 Aliphatics (Unadj.)	18.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	18.5	50	9.7	ug/l	JB
	C5- C8 Aliphatics	11.8	50	8.8	ug/l	J
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	80%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	MW-7	Date Sampled:	12/14/16
Lab Sample ID:	MC49177-11	Date Received:	12/16/16
Matrix:	AQ - Ground Water	Percent Solids:	n/a
Method:	MADEP EPH REV 1.1 SW846 3510C		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16562.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

Run #	Initial Volume	Final Volume
Run #1	980 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	72.5	100	29	ug/l	J
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	71.1	100	29	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	88%		40-140%
321-60-8	2-Fluorobiphenyl	84%		40-140%
3386-33-2	1-Chlorooctadecane	44%		40-140%
580-13-2	2-Bromonaphthalene	86%		40-140%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: FB121416
 Lab Sample ID: MC49177-12
 Matrix: AQ - Field Blank Water
 Method: MADEP VPH REV 1.1
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78409.D	1	12/21/16	AF	n/a	n/a	GWX3884
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	9.7	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	11.6	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	84%		70-130%
	2,3,4-Trifluorotoluene	91%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: FB121416
 Lab Sample ID: MC49177-12
 Matrix: AQ - Field Blank Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16563.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2 ^a	DE16592.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

	Initial Volume	Final Volume
Run #1	920 ml	2.0 ml
Run #2	920 ml	2.0 ml

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	110	31	ug/l	
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	ND	110	31	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	91%	65%	40-140%
321-60-8	2-Fluorobiphenyl	102%	80%	40-140%
3386-33-2	1-Chlorooctadecane	31% ^b	37% ^b	40-140%
580-13-2	2-Bromonaphthalene	104%	81%	40-140%

(a) Confirmation run.

(b) Outside control limits .Sample results confirmed by re-fractionation/reanalysis.



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-22S
 Lab Sample ID: MC49177-13
 Matrix: AQ - Ground Water
 Method: MADEP VPH REV 1.1
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78386.D	1	12/20/16	AF	n/a	n/a	GWX3883
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	14.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	81%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: MW-22S
 Lab Sample ID: MC49177-13
 Matrix: AQ - Ground Water
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BMSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/14/16
 Date Received: 12/16/16
 Percent Solids: n/a

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16564.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
Run #2							

Run #	Initial Volume	Final Volume
Run #1	920 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	48.7	110	31	ug/l	J
	C9-C18 Aliphatics	ND	110	18	ug/l	
	C19-C36 Aliphatics	ND	110	29	ug/l	
	C11-C22 Aromatics	48.0	110	31	ug/l	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	94%		40-140%
321-60-8	2-Fluorobiphenyl	93%		40-140%
3386-33-2	1-Chlorooctadecane	42%		40-140%
580-13-2	2-Bromonaphthalene	94%		40-140%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID:	EB121516	Date Sampled:	12/15/16
Lab Sample ID:	MC49177-14	Date Received:	12/16/16
Matrix:	AQ - Equipment Blank	Percent Solids:	n/a
Method:	MADEP VPH REV 1.1		
Project:	BMSMC, Building 5 Area, Puerto Rico		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	WX78410.D	1	12/21/16	AF	n/a	n/a	GWX3884
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

Volatile TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C5- C8 Aliphatics (Unadj.)	ND	50	8.8	ug/l	
	C9- C12 Aliphatics (Unadj.)	10.4	50	8.0	ug/l	JB
	C9- C10 Aromatics (Unadj.)	11.2	50	9.7	ug/l	JB
	C5- C8 Aliphatics	ND	50	8.8	ug/l	
	C9- C12 Aliphatics	ND	50	8.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
	2,3,4-Trifluorotoluene	82%		70-130%
	2,3,4-Trifluorotoluene	93%		70-130%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

SGS Accutest LabLink@170805 14:48 04-Jan-2017

Report of Analysis

Page 1 of 1

Client Sample ID: EB121516
 Lab Sample ID: MC49177-14
 Matrix: AQ - Equipment Blank
 Method: MADEP EPH REV 1.1 SW846 3510C
 Project: BSMC, Building 5 Area, Puerto Rico

Date Sampled: 12/15/16
 Date Received: 12/16/16
 Percent Solids: n/a

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	DE16593.D	1	01/03/17	TA	12/27/16	OP49325	GDE925
Run #2							

	Initial Volume	Final Volume
Run #1	960 ml	2.0 ml
Run #2		

Extractable TPHC Ranges

CAS No.	Compound	Result	RL	MDL	Units	Q
	C11-C22 Aromatics (Unadj.)	ND	100	30	ug/l	
	C9-C18 Aliphatics	ND	100	17	ug/l	
	C19-C36 Aliphatics	ND	100	28	ug/l	
	C11-C22 Aromatics	ND	100	30	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	83%		40-140%
321-60-8	2-Fluorobiphenyl	82%		40-140%
3386-33-2	1-Chlorooctadecane	56%		40-140%
580-13-2	2-Bromonaphthalene	84%		40-140%



ND = Not detected MDL = Method Detection Limit
 RL = Reporting Limit
 E = Indicates value exceeds calibration range

J = Indicates an estimated value
 B = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: MC49177

Account: AMANYWP Anderson Mulholland and Assoc.

Project: BSMC, Building 5 Area, Puerto Rico

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
MC49177-3MS	WX78370.D	1	12/20/16	AF	n/a	n/a	GWX3883
MC49177-3MSD	WX78371.D	1	12/20/16	AF	n/a	n/a	GWX3883
MC49177-3	WX78369.D	1	12/20/16	AF	n/a	n/a	GWX3883

The QC reported here applies to the following samples:

Method: MADEP VPH REV 1.1

MC49177-1, MC49177-2, MC49177-3, MC49177-4, MC49177-5, MC49177-6, MC49177-7, MC49177-8, MC49177-9, MC49177-10, MC49177-11, MC49177-13

CAS No.	Compound	MC49177-3 ug/l	Spike Q	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C5- C8 Aliphatics (Unadj.)	ND	300	355	119	300	350	117	1	70-130/25
	C9- C12 Aliphatics (Unadj.)	12.8	JB 450	457	111	450	445	108	3	70-130/25
	C9- C10 Aromatics (Unadj.)	14.8	JB 150	137	81	150	133	79	3	70-130/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49177-3	Limits
	2,3,4-Trifluorotoluene	80%	80%	85%	70-130%
	2,3,4-Trifluorotoluene	88%	87%	91%	70-130%



* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Page 1 of 1

Job Number: MC49177

Account: AMANYWP Anderson Mulholland and Assoc.

Project: BSMC, Building 5 Area, Puerto Rico

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP49325-MS	DE16544.D	1	12/28/16	TA	12/27/16	OP49325	GDE923
OP49325-MSD	DE16545.D	1	12/28/16	TA	12/27/16	OP49325	GDE923
MC49177-3	DE16553.D	1	12/29/16	TA	12/27/16	OP49325	GDE924
MC49177-3 ^a	DE16581.D	1	01/03/17	TA	12/27/16	OP49325	GDE925

The QC reported here applies to the following samples:

Method: MADEP EPH REV 1.1

MC49177-1, MC49177-2, MC49177-3, MC49177-4, MC49177-5, MC49177-6, MC49177-7, MC49177-8, MC49177-9, MC49177-10, MC49177-11, MC49177-12, MC49177-13, MC49177-14

CAS No.	Compound	MC49177-3 ug/l	Spike Q	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
	C11-C22 Aromatics (Unadj.)	41.1	J	870	88	851	726	80	11	40-140/25
	C9-C18 Aliphatics	ND		326	63	319	188	59	9	40-140/25
	C19-C36 Aliphatics	ND		435	92	426	375	88	7	40-140/25

CAS No.	Surrogate Recoveries	MS	MSD	MC49177-3	MC49177-3	Limits
84-15-1	o-Terphenyl	94%	88%	77%	64%	40-140%
321-60-8	2-Fluorobiphenyl	95%	99%	97%	84%	40-140%
3386-33-2	1-Chlorooctadecane	49%	46%	26%* ^b	29%* ^b	40-140%
580-13-2	2-Bromonaphthalene	97%	99%	97%	85%	40-140%

(a) Confirmation run.

(b) Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis.



* = Outside of Control Limits.

MA

30 D'Angelo Dr. Building One, Marlborough, MA 01752
TEL 508-481-6200 FAX 508-481-7753
www.accutest.com

FED-EX Tracking # 777561610842
Account Order # MC49177
Account Job #

Client / Reporting Information		Project Information		Requested Analysis (see TEST CODE sheet)												Matrix Codes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Company Name Anderson Mulholland & Associates		Project Name 4th Q 2018 Groundwater Sampling - Onsite Wells														DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge SED - Sediment CI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WIP - Wipe FB - Field Blank ES - Equipment Blank RB - Rinse Blank TB - Trip Blank																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Street Address 2700 Westchester Avenue, Suite 417		Billing Information (if different from Report to)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
City State Zip Troy NY 12187		Company Name																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Purchase Order # 10877		Project #																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Project Contact Terry Taylor		Street Address																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Phone # 514-251-0400		City State Zip																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
E-mail		Client Purchase Order #																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Project Manager Terry Taylor		Admission																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Sample(s) Name(s)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Field ID / Point of Collection		MECH/CI Vol #	Date	Time	Sampled by	Matrix	# of bottles	NO	NOH	NOH2	NOH3	NOH4	NOH5	NOH6	NOH7	NOH8	NOH9	NOH10	NOH11	NOH12	NOH13	NOH14	NOH15	NOH16	NOH17	NOH18	NOH19	NOH20	NOH21	NOH22	NOH23	NOH24	NOH25	NOH26	NOH27	NOH28	NOH29	NOH30	NOH31	NOH32	NOH33	NOH34	NOH35	NOH36	NOH37	NOH38	NOH39	NOH40	NOH41	NOH42	NOH43	NOH44	NOH45	NOH46	NOH47	NOH48	NOH49	NOH50	NOH51	NOH52	NOH53	NOH54	NOH55	NOH56	NOH57	NOH58	NOH59	NOH60	NOH61	NOH62	NOH63	NOH64	NOH65	NOH66	NOH67	NOH68	NOH69	NOH70	NOH71	NOH72	NOH73	NOH74	NOH75	NOH76	NOH77	NOH78	NOH79	NOH80	NOH81	NOH82	NOH83	NOH84	NOH85	NOH86	NOH87	NOH88	NOH89	NOH90	NOH91	NOH92	NOH93	NOH94	NOH95	NOH96	NOH97	NOH98	NOH99	NOH100	NOH101	NOH102	NOH103	NOH104	NOH105	NOH106	NOH107	NOH108	NOH109	NOH110	NOH111	NOH112	NOH113	NOH114	NOH115	NOH116	NOH117	NOH118	NOH119	NOH120	NOH121	NOH122	NOH123	NOH124	NOH125	NOH126	NOH127	NOH128	NOH129	NOH130	NOH131	NOH132	NOH133	NOH134	NOH135	NOH136	NOH137	NOH138	NOH139	NOH140	NOH141	NOH142	NOH143	NOH144	NOH145	NOH146	NOH147	NOH148	NOH149	NOH150	NOH151	NOH152	NOH153	NOH154	NOH155	NOH156	NOH157	NOH158	NOH159	NOH160	NOH161	NOH162	NOH163	NOH164	NOH165	NOH166	NOH167	NOH168	NOH169	NOH170	NOH171	NOH172	NOH173	NOH174	NOH175	NOH176	NOH177	NOH178	NOH179	NOH180	NOH181	NOH182	NOH183	NOH184	NOH185	NOH186	NOH187	NOH188	NOH189	NOH190	NOH191	NOH192	NOH193	NOH194	NOH195	NOH196	NOH197	NOH198	NOH199	NOH200	NOH201	NOH202	NOH203	NOH204	NOH205	NOH206	NOH207	NOH208	NOH209	NOH210	NOH211	NOH212	NOH213	NOH214	NOH215	NOH216	NOH217	NOH218	NOH219	NOH220	NOH221	NOH222	NOH223	NOH224	NOH225	NOH226	NOH227	NOH228	NOH229	NOH230	NOH231	NOH232	NOH233	NOH234	NOH235	NOH236	NOH237	NOH238	NOH239	NOH240	NOH241	NOH242	NOH243	NOH244	NOH245	NOH246	NOH247	NOH248	NOH249	NOH250	NOH251	NOH252	NOH253	NOH254	NOH255	NOH256	NOH257	NOH258	NOH259	NOH260	NOH261	NOH262	NOH263	NOH264	NOH265	NOH266	NOH267	NOH268	NOH269	NOH270	NOH271	NOH272	NOH273	NOH274	NOH275	NOH276	NOH277	NOH278	NOH279	NOH280	NOH281	NOH282	NOH283	NOH284	NOH285	NOH286	NOH287	NOH288	NOH289	NOH290	NOH291	NOH292	NOH293	NOH294	NOH295	NOH296	NOH297	NOH298	NOH299	NOH300	NOH301	NOH302	NOH303	NOH304	NOH305	NOH306	NOH307	NOH308	NOH309	NOH310	NOH311	NOH312	NOH313	NOH314	NOH315	NOH316	NOH317	NOH318	NOH319	NOH320	NOH321	NOH322	NOH323	NOH324	NOH325	NOH326	NOH327	NOH328	NOH329	NOH330	NOH331	NOH332	NOH333	NOH334	NOH335	NOH336	NOH337	NOH338	NOH339	NOH340	NOH341	NOH342	NOH343	NOH344	NOH345	NOH346	NOH347	NOH348	NOH349	NOH350	NOH351	NOH352	NOH353	NOH354	NOH355	NOH356	NOH357	NOH358	NOH359	NOH360	NOH361	NOH362	NOH363	NOH364	NOH365	NOH366	NOH367	NOH368	NOH369	NOH370	NOH371	NOH372	NOH373	NOH374	NOH375	NOH376	NOH377	NOH378	NOH379	NOH380	NOH381	NOH382	NOH383	NOH384	NOH385	NOH386	NOH387	NOH388	NOH389	NOH390	NOH391	NOH392	NOH393	NOH394	NOH395	NOH396	NOH397	NOH398	NOH399	NOH400	NOH401	NOH402	NOH403	NOH404	NOH405	NOH406	NOH407	NOH408	NOH409	NOH410	NOH411	NOH412	NOH413	NOH414	NOH415	NOH416	NOH417	NOH418	NOH419	NOH420	NOH421	NOH422	NOH423	NOH424	NOH425	NOH426	NOH427	NOH428	NOH429	NOH430	NOH431	NOH432	NOH433	NOH434	NOH435	NOH436	NOH437	NOH438	NOH439	NOH440	NOH441	NOH442	NOH443	NOH444	NOH445	NOH446	NOH447	NOH448	NOH449	NOH450	NOH451	NOH452	NOH453	NOH454	NOH455	NOH456	NOH457	NOH458	NOH459	NOH460	NOH461	NOH462	NOH463	NOH464	NOH465	NOH466	NOH467	NOH468	NOH469	NOH470	NOH471	NOH472	NOH473	NOH474	NOH475	NOH476	NOH477	NOH478	NOH479	NOH480	NOH481	NOH482	NOH483	NOH484	NOH485	NOH486	NOH487	NOH488	NOH489	NOH490	NOH491	NOH492	NOH493	NOH494	NOH495	NOH496	NOH497	NOH498	NOH499	NOH500	NOH501	NOH502	NOH503	NOH504	NOH505	NOH506	NOH507	NOH508	NOH509	NOH510	NOH511	NOH512	NOH513	NOH514	NOH515	NOH516	NOH517	NOH518	NOH519	NOH520	NOH521	NOH522	NOH523	NOH524	NOH525	NOH526	NOH527	NOH528	NOH529	NOH530	NOH531	NOH532	NOH533	NOH534	NOH535	NOH536	NOH537	NOH538	NOH539	NOH540	NOH541	NOH542	NOH543	NOH544	NOH545	NOH546	NOH547	NOH548	NOH549	NOH550	NOH551	NOH552	NOH553	NOH554	NOH555	NOH556	NOH557	NOH558	NOH559	NOH560	NOH561	NOH562	NOH563	NOH564	NOH565	NOH566	NOH567	NOH568	NOH569	NOH570	NOH571	NOH572	NOH573	NOH574	NOH575	NOH576	NOH577	NOH578	NOH579	NOH580	NOH581	NOH582	NOH583	NOH584	NOH585	NOH586	NOH587	NOH588	NOH589	NOH590	NOH591	NOH592	NOH593	NOH594	NOH595	NOH596	NOH597	NOH598	NOH599	NOH600	NOH601	NOH602	NOH603	NOH604	NOH605	NOH606	NOH607	NOH608	NOH609	NOH610	NOH611	NOH612	NOH613	NOH614	NOH615	NOH616	NOH617	NOH618	NOH619	NOH620	NOH621	NOH622	NOH623	NOH624	NOH625	NOH626	NOH627	NOH628	NOH629	NOH630	NOH631	NOH632	NOH633	NOH634	NOH635	NOH636	NOH637	NOH638	NOH639	NOH640	NOH641	NOH642	NOH643	NOH644	NOH645	NOH646	NOH647	NOH648	NOH649	NOH650	NOH651	NOH652	NOH653	NOH654	NOH655	NOH656	NOH657	NOH658	NOH659	NOH660	NOH661	NOH662	NOH663	NOH664	NOH665	NOH666	NOH667	NOH668	NOH669	NOH670	NOH671	NOH672	NOH673	NOH674	NOH675	NOH676	NOH677	NOH678	NOH679	NOH680	NOH681	NOH682	NOH683	NOH684	NOH685	NOH686	NOH687	NOH688	NOH689	NOH690	NOH691	NOH692	NOH693	NOH694	NOH695	NOH696	NOH697	NOH698	NOH699	NOH700	NOH701	NOH702	NOH703	NOH704	NOH705	NOH706	NOH707	NOH708	NOH709	NOH710	NOH711	NOH712	NOH713	NOH714	NOH715	NOH716	NOH717	NOH718	NOH719	NOH720	NOH721	NOH722	NOH723	NOH724	NOH725	NOH726	NOH727	NOH728	NOH729	NOH730	NOH731	NOH732	NOH733	NOH734	NOH735	NOH736	NOH737	NOH738	NOH739	NOH740	NOH741	NOH742	NOH743	NOH744	NOH745	NOH746	NOH747	NOH748	NOH749	NOH750	NOH751	NOH752	NOH753	NOH754	NOH755	NOH756	NOH757	NOH758	NOH759	NOH760	NOH761	NOH762	NOH763	NOH764	NOH765	NOH766	NOH767	NOH768	NOH769	NOH770	NOH771	NOH772	NOH773	NOH774	NOH775	NOH776	NOH777	NOH778	NOH779	NOH780	NOH781	NOH782	NOH783	NOH784	NOH785	NOH786	NOH787	NOH788	NOH789	NOH790	NOH791	NOH792	NOH793	NOH794	NOH795	NOH796	NOH797	NOH798	NOH799	NOH800	NOH801	NOH802	NOH803	NOH804	NOH805	NOH806	NOH807	NOH808	NOH809	NOH810	NOH811	NOH812	NOH813	NOH814	NOH815	NOH816	NOH817	NOH818	NOH819	NOH820	NOH821	NOH822	NOH823	NOH824	NOH825	NOH826	NOH827	NOH828	NOH829	NOH830	NOH831	NOH832	NOH833	NOH834	NOH835	NOH836	NOH837	NOH838	NOH839	NOH840	NOH841	NOH842	NOH843	NOH844	NOH845	NOH846	NOH847	NOH848	NOH849	NOH850	NOH851	NOH852	NOH853	NOH854	NOH855	NOH856	NOH857	NOH858	NOH859	NOH860	NOH861	NOH862	NOH863	NOH864	NOH865	NOH866	NOH867	NOH868	NOH869	NOH870	NOH871	NOH872	NOH873	NOH874	NOH875	NOH876	NOH877	NOH878	NOH879	NOH880	NOH881	NOH882	NOH883	NOH884	NOH885	NOH886	NOH887	NOH888	NOH889	NOH890	NOH891	NOH892	NOH893	NOH894	NOH895	NOH896	NOH897	NOH898	NOH899	NOH900	NOH901	NOH902	NOH903	NOH904	NOH905	NOH906	NOH907	NOH908	NOH909	NOH910	NOH911	NOH912	NOH913	NOH914	NOH915	NOH916	NOH917	NOH918	NOH919	NOH920	NOH921	NOH922	NOH923	NOH924	NOH925	NOH926	NOH927	NOH928	NOH929	NOH930	NOH931	NOH932	NOH933	NOH934	NOH935	NOH936	NOH937	NOH938	NOH939	NOH940	NOH941	NOH942	NOH943	NOH944	NOH945	NOH946	NOH947	NOH948	NOH949	NOH950	NOH951	NOH952	NOH953	NOH954	NOH955	NOH956	NOH957	NOH958	NOH959	NOH960	NOH961	NOH962	NOH963	NOH964	NOH965	NOH966	NOH967	NOH968	NOH969	NOH970	NOH971	NOH972	NOH973	NOH974	NOH975	NOH976	NOH977	NOH978	NOH979	NOH980	NOH981	NOH982	NOH983	NOH984	NOH985	NOH986	NOH987	NOH988	NOH989	NOH990	NOH991	NOH992	NOH993	NOH994	NOH995	NOH996	NOH997	NOH998	NOH999	NOH1000



PAGE ²~~2~~ OF ²~~2~~

30 D'Angelo Drive, Building One, Marlborough, MA 01752
TEL 508-481-4200 FAX 508-481-7793
www.aeculog.com

7779 6164 0842

Some Order Control &

Amount due to

4154917

[illegible]

5.15

MC49177: Chain of Custody
Page 2 of 4

EXECUTIVE NARRATIVE

SDG No: **MC49177** Laboratory: **Accutest, Massachusetts**
Analysis: **MADEP VPH** Number of Samples: **16**
Location: **BMSMC, Building 5 Area**
Humacao, PR

SUMMARY: Sixteen (16) samples were analyzed for Volatiles TPHC Ranges by method MADEP VPH. Samples were validated following the METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: **None**
Major: **None**
Minor: **None**

Critical findings: **None**
Major findings: **None**
Minor findings:

1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.
2. Target analytes detected in the method and field/equipment blanks. Laboratory qualified positive results below the reporting limit with a B qualifier, no additional qualification performed.
3. MS/MSD % recovery within the laboratory control limits except for the cases described in the Data Review Worksheet. No action taken, recovery criteria apply to the unspiked sample. Unspiked sample from another job.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: **Rafael Infante**
Chemist License 1888

Signature:



Date: **January 21, 2017**

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49177-1

Sample location: BMSMC Building 5 Area

Sampling date: 12/13/2016

Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	161	ug/L	1	-	J	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	85000	ug/L	100	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	151	ug/L	1	-	-	Yes
Ç5 - C8 Aliphatics	85.5	ug/L	1	-	J	Yes ✓
Ç9 - C12 Aliphatics	17800	ug/L	1	-	-	Yes

Sample ID: MC49177-2

Sample location: BMSMC Building 5 Area

Sampling date: 12/14/2016

Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	10.1	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	14.5	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-3
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	12.8	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	14.8	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-4
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: AQ -Field Blank Water

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	9.2	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	12.8	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-5
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	42.9	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	59.5	ug/L	1	B	B	Yes
Ç9 - C10 Aromatics (Unadj.)	29.7	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	31.4	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	27.3	ug/L	1	J	J	Yes

Sample ID: MC49177-6
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	15.8	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	14.4	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.9	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	15.3	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-7
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	23.6	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	17.9	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.1	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	14.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-8
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	11.1	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	16.2	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	16.0	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-9
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50.2	ug/L	1	-	J	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	13.8	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	15.2	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	45.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-10
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	10.4	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	13.4	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-11
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	12.1	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics (Unadj.)	18.4	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	18.5	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	11.5	ug/L	1	J	J	Yes
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-12
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Field Blank Water

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	9.7	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	11.6	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-13
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	10	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	14.2	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-14
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: AQ - Equipment Blank

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	10.4	ug/L	1	JB	JB	Yes
Ç9 - C10 Aromatics (Unadj.)	11.2	ug/L	1	JB	JB	Yes
Ç5 - C8 Aliphatics	50	ug/L	1	-	UJ	Yes ✓
Ç9 - C12 Aliphatics	50	ug/L	1	-	U	Yes

Sample ID: MC49177-3MS
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	355	ug/L	1	-	J	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	457	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	137	ug/L	1	-	-	Yes

Sample ID: MC49177-3MSD
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP VPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç5 - C8 Aliphatics (Unadj.)	350	ug/L	1	-	J	Yes ✓
Ç9 - C12 Aliphatics (Unadj.)	455	ug/L	1	-	-	Yes
Ç9 - C10 Aromatics (Unadj.)	133	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation Full: X Project Number: MC49177
 Limited: _____ Date: 12/13-15/2016
 Shipping date: 12/15/2016
 EPA Region: 2

REVIEW OF VOLATILE PETROLEUM HYDROCARBON (VPHs) PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to the data validation guidance documents in the following order of precedence METHOD FOR THE DETERMINATION OF VOLATILE PETROLEUM HYDROCARBONS (VPH), Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) Accutest Laboratories data package received has been reviewed and the quality control and performance data summarized. The data review for SVOCs included:

Lab. Project/SDG No.: MC49177 Sample matrix: Groundwater
 No. of Samples: 16
 Field blank No.: MC49177-4; MC49177-12
 Equipment blank No.: MC49177-2; MC49177-14
 Trip blank No.: _____
 Field duplicate No.: MC49177-8/MC49177-9

<u>X</u> Data Completeness	<u>X</u> Laboratory Control Spikes
<u>X</u> Holding Times	<u>X</u> Field Duplicates
<u>N/A</u> GC/MS Tuning	<u>X</u> Calibrations
<u>N/A</u> Internal Standard Performance	<u>X</u> Compound Identifications
<u>X</u> Blanks	<u>X</u> Compound Quantitation
<u>X</u> Surrogate Recoveries	<u>X</u> Quantitation Limits
<u>X</u> Matrix Spike/Matrix Spike Duplicate	

Overall _____ Comments: _____
_Volatiles_by_GC_by_Method_MADEP_VPH,_REV_1.1.

Definition of Qualifiers:

J- Estimated results
 U- Compound not detected
 R- Rejected data
 UJ- Estimated nondetect

Reviewer: Rafael Delant
 Date: January 20, 2017

DATA REVIEW WORKSHEETS

All criteria were met x
Criteria were not met and/or see below

I. DATA COMPLETNESS

A. Data Package:

MISSING INFORMATION

DATE LAB. CONTACTED

DATE RECEIVED

[illegible]

B. Other

Discrepancies:

[The page contains faint horizontal lines, suggesting it was part of a lined notebook or document.]

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples analyzed within method recommended holding time. Sample preservation within the required criteria.				

Criteria

Preservation:

Samples analyzed with ambient purge temperature: Samples must be acidified to a pH of 2.0 or less at the time of collection.

Samples analyzed with heated purge temperature: Samples must be treated to a pH of 11.0 or greater at the time of collection.

Methanol preservation of soil/sediment samples is mandatory. Methanol (purge-and-trap grade) must be added to the sample vial before or immediately after sample collection. In lieu of the in-field preservation of samples with methanol, soil samples may be obtained in specially-designed air tight sampling devices, provided that the samples are extruded and preserved in methanol within 48 hours of collection.

Holding times:

Aqueous samples using ambient or heated purge - analyze within 14 days.

Soil/sediment samples - analysis within 28 days.

Cooler temperature (Criteria: 4 ± 2 °C): 3.8°C

Actions: Qualify positive results/non-detects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).

If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and rejects nondetects (R).

If samples were not at the proper temperature ($> 10^{\circ}\text{C}$) or improperly preserved, use professional judgment to qualify the results.

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met and/or see below

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration: 10/31/16

Dates of initial calibration verification: 10/31/16

Instrument ID numbers: GCWX

Matrix/Level: AQUEOUS/MEDIUM

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
Initial and initial calibration verification meet method specific requirements				

Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C5-C8 Aliphatic Hydrocarbons and C9-C12 Aliphatic Hydrocarbons using the FID chromatogram. Calculate the collective CF for the C9-C10 Aromatic Hydrocarbons using the PID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.

Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples, and at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.
- If the percent difference (%D) for any analyte varies from the predicted response by more than $\pm 25\%$, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and

DATA REVIEW WORKSHEET

- percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects.

If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration: _____10/31/16_____

Dates of continuing calibration verification: __12/20/16;_12/21/16__

Dates of final calibration verification: _10/31/16;_12/20/16;_12/21/16_

Instrument ID numbers: _____GCWX_____

Matrix/Level: _____AQUEOUS/MEDIUM_____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
12/20/16	cc3857-50	rt5.5/7	27.4 %	MC49177-1; -3; -3MS/-3MSD; -5 to - 11; -13; -2; -4
			26.5 %	
12/21/16	cc3857-50	rt5.5/7	31.2 %	MC49177-12; -14;
			28.3 %	

Note: Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for VPH in the rt5.5/7 retention time window in the continuing and ending calibration verification outside the method performance criteria. Results are qualified as estimated in affected samples.

A separate worksheet should be filled for each initial curve

DATA REVIEW WORKSHEETS

All criteria were met _____
 Criteria were not met and/or see below X

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
<u> METHOD BLANKS MEET THE METHOD SPECIFIC CRITERIA EXCEPT IN THE CASES DESCRIBED IN THIS DOCUMENT. </u>				
<u> 12/20/16 </u>	<u> GWX3883-MB </u>	<u> Aqueous/low </u>	<u> C9-C12_Aliphatics_(Unadj.) </u>	<u> 10.5_ug/L </u>
			<u> C9-C10_Aromatics_(Unadj.) </u>	<u> 14.4_ug/L </u>
<u> 12/21/16 </u>	<u> GWX3884-MB </u>	<u> Aqueous/low </u>	<u> C9-C12_Aliphatics_(Unadj.) </u>	<u> 11.4_ug/L </u>
			<u> C9-C10_Aromatics_(Unadj.) </u>	<u> 12.2_ug/L </u>

Note: Laboratory qualified positive results below the reporting limit with a B qualifier, no additional qualification performed.

Field/Trip/Equipment

A methanol trip blank or acidified reagent water trip blank **should** continually accompany each soil/sediment sample or water sample batch, respectively, during sampling, storage, and analysis.

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
<u> NO TRIP BLANK ASSOCIATED WITH THIS DATA PACKAGE. </u>				
<u> ANALYTES DETECTED IN FIELD/EQUIPMENT BLANKS ANALYZED AT A CONCENTRATION BELOW THE REPORTING LIMITS EXCEPT FOR THE CASES DESCRIBED IN HIS DOCUMENT. </u>				
<u> 12/20/16 </u>	<u> MC49177-2 </u>	<u> Aqueous/low </u>	<u> C5-C8_Aliphatics_(Unadj.) </u>	<u> 10.1_ug/L </u>
			<u> C9-C12_Aliphatics_(Unadj.) </u>	<u> 14.5_ug/L </u>

DATA REVIEW WORKSHEETS

DATE ANALYZED	LAB ID	LEVEL/MATRIX	COMPOUND	CONCENTRATION UNITS
12/20/16	MC49177-4_	Aqueous/low_	C9-C12_Aliphatics_(Unadj.)	9.2_ug/L_
			C9-C10_Aromatics_(Unadj.)	12.8_ug/L_
12/21/16	MC49177-12_	Aqueous/low_	C9-C12_Aliphatics_(Unadj.)	9.7_ug/L_
			C9-C10_Aromatics_(Unadj.)	11.6_ug/L_
12/21/16	MC49177-14_	Aqueous/low_	C9-C12_Aliphatics_(Unadj.)	10.4_ug/L_
			C9-C10_Aromatics_(Unadj.)	12.8_ug/L_

Note: No action taken, analytes not detected in samples above the reporting limit.

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is < sample quantitation limit (SQL) and < AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but < AL, report the compound as not detected (U) at the reported concentration.

If the concentration is > AL, report the concentration unqualified.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.

Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND	ACTION
	2,3,4-Trifluorotoluene	

 SURROGATE_STANDARD_RECOVERIES_WITHIN_LABORATORY_CONTROL
 LIMITS

QC Limits* (Aqueous)

 LL_to_UL 70_to_130 to to

QC Limits* (Solid)

 LL_to_UL to to to

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 70% or more than 130%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
- (2) Percent moisture of associated soil/sediment sample is >25% and surrogate recovery is >10%; or
- (3) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- **Matrix duplicate** - Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 70 - 130% of the true value. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range), but must be noted in the narrative if <30%.

MS/MSD Recoveries and Precision Criteria

Sample ID: MC49177-3_MS/MSD Matrix/Level: Groundwater

List the %Rs, RPD of the compounds which do not meet the QC criteria.

Note: MS/MSD % recovery and RPD within laboratory control limits.

DATA REVIEW WORKSHEETS

Sample ID: MC49195-2_MS/MSD

Matrix/Level: Groundwater

The QC reported here applies to the following samples:
MC49177-12, MC49177-14

Method: **MADEP VPH REV 1.1**

Compound	MC49195-2 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
C9-C10										
Aromatics (Unadj.)	15.4		150	116	67* a	150	117	68* a	1	70-130/25

(a) Outside control limits due to possible matrix interference.

* = Outside of Control Limits.

Note: MS/MSD % recovery outside the laboratory control limits. No action taken, recovery criteria apply to the unspiked sample. Unspiked sample from another job.

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRATION		MS	MSD	%RPD	ACTION
	SAMPLE					

Criteria: None specified, use %RSD \leq 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J).

If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION
<u> LCS_RECOVERY_WITHIN_LABORATORY_CONTROL_LIMITS </u>				

Criteria:

- * Refer to QAPP for specific criteria.
- * The spike recovery must be between 70% and 130%. Lower recoveries of n-nonane are permissible (if included in the calibration of the C9-C12 aliphatic range). If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative.

Actions:

Actions on LCS recovery should be based on both the number of compounds that are outside the %R criteria and the magnitude of the exceedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.

If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.

If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? Yes or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met and/or see below

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs: MC49177-8/MC49177-9

Matrix: Groundwater

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
Field duplicate analyzed with this data package. RPD within laboratory and validation guidance document criteria ($\pm 50\%$) for analytes detected above reporting limits.					

Criteria:

The project QAPP should be reviewed for project-specific information.
 RPD $\pm 30\%$ for aqueous samples, RPD $\pm 50\%$ for solid samples if results are \geq SQL.
 If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is $\geq 5x$ the SQL qualify (J/UJ).

Note: If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is $< 5x$ the SQL, use professional judgment to determine if qualification is appropriate.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

1. Verify that the target analytes were within the retention time windows.
 - Retention time windows must be re-established for each Target VPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
 - Coelution of the m- and p- xylene isomers is permissible.
 - All surrogates must be adequately resolved from individual Target Analytes included in the VPH Component Standard.
 - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
 - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

Note: Target analytes were within the retention time window.

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

1. In the space below, please show a minimum of one sample calculation:

MC49177-1 VPH (C9 – C12 Aliphatics) RF = 2.125×10^4

FID

$$[] = (3343631) / (2.125 \times 10^4)$$

$$[] = 157.3 \text{ ppb} \quad \text{Ok}$$

MC49177-1 VPH (C9 – C10 Aromatics) RF = 7.865×10^3

PID

$$[] = (1187738) / (7.865 \times 10^3)$$

$$[] = 151.0 \text{ ppb} \quad \text{Ok}$$

2. If requested, verify that the results were above the laboratory method detection limit (MDLs).

3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION
MC49177-1	100 x	C9 – C12 aliphatics over the calibration range.

If dilution was not performed and the results were above the concentration range, estimate results (J) for the affected compounds. List the affected samples/compounds:

EXECUTIVE NARRATIVE

SDG No: **MC49177** Laboratory: **Accutest, Massachusetts**
Analysis: **MADEP EPH** Number of Samples: **16**
Location: **BMSMC, Building 5 Area**
Humacao, PR

SUMMARY: Sixteen (16) samples were analyzed for Extractable TPHC Ranges by method MADEP EPH. Samples were validated following the METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (EPH) quality control criteria, Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Results are valid and can be used for decision making purposes.

Critical issues: **None**
Major: **None**
Minor: **None**

Critical findings: **None**
Major findings: **None**
Minor findings:

1. Continuing and final calibration verification meets method specific requirements except in the cases described in this document. The % difference for EPH in the C11-C22 (Aromatics) retention time window in the continuing and ending calibration verification was outside the method performance criteria. Results are qualified as estimated in affected samples.
2. 1-chlorooctadecane recovered outside the laboratory control limits in samples MC49177-1 to -9; and -12. Outside control limits due to possible matrix interference. Confirmed by refractionation/reanalysis. No action taken.
3. C9-C18 aliphatics LCS/LCS % recovery RPD outside laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: **Rafael Infante**
Chemist License 1888

Signature:



Date: **January 21, 2017**

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: MC49177-1
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	49.8	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	71.8	ug/L	1	J	J	Yes
Ç11 - C22 Aromatics	48.8	ug/L	1	J	J	Yes

Sample ID: MC49177-2
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Equipment Blank

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ	Yes ✓ /
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	110	ug/L	1	-	UJ	Yes ✓ /

Sample ID: MC49177-3
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	41.1	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	40.4	ug/L	1	J	J	Yes

Sample ID: MC49177-4
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: AQ -Field Blank Water
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ	Yes ✓
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	110	ug/L	1	-	UJ	Yes ✓

Sample ID: MC49177-5
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	80.6	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	77.7	ug/L	1	J	J	Yes

Sample ID: MC49177-6
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	57.3	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	31.3	ug/L	1	J	J	Yes
Ç11 - C22 Aromatics	57.3	ug/L	1	J	J	Yes

Sample ID: MC49177-7
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	98.2	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	63.5	ug/L	1	J	J	Yes

Sample ID: MC49177-8
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	36.6	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	35.6	ug/L	1	J	J	Yes

Sample ID: MC49177-9
Sample location: BMSMC Building 5 Area
Sampling date: 12/13/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	38.7	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	37.7	ug/L	1	J	J	Yes

Sample ID: MC49177-10
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	39.3	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	38.9	ug/L	1	J	J	Yes

Sample ID: MC49177-11
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	72.5	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	71.1	ug/L	1	J	J	Yes

Sample ID: MC49177-12
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: AQ - Field Blank Water
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	110	ug/L	1	-	UJ ✓	Yes ✓
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	100	ug/L	1	-	UJ	Yes ✓

Sample ID: MC49177-13
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	48.7	ug/L	1	J	J	Yes
Ç9 - C18 Aliphatics	110	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	110	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	48.0	ug/L	1	J	UJ	Yes

Sample ID: MC49177-14
Sample location: BMSMC Building 5 Area
Sampling date: 12/15/2016
Matrix: AQ - Equipment Blank
METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	100	ug/L	1	-	UJ	Yes ✓
Ç9 - C18 Aliphatics	100	ug/L	1	-	U	Yes
Ç19 - C36 Aliphatics	100	ug/L	1	-	U	Yes
Ç11 - C22 Aromatics	100	ug/L	1	-	UJ	Yes ✓

Sample ID: MC49177-3MS
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	870	ug/L	1	-	J	Yes ✓
Ç9 - C18 Aliphatics	326	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	435	ug/L	1	-	-	Yes

Sample ID: MC49177-3MSD
Sample location: BMSMC Building 5 Area
Sampling date: 12/14/2016
Matrix: Groundwater

METHOD: MADEP EPH

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Ç11 - C22 Aromatics (Unadj.)	726	ug/L	1	-	J	Yes ✓
Ç9 - C18 Aliphatics	188	ug/L	1	-	-	Yes
Ç19 - C36 Aliphatics	375	ug/L	1	-	-	Yes

DATA REVIEW WORKSHEETS

Type of validation Full: ☒ Limited: ☐ Project Number: MC49177 Date: 12/13-15/2016 Shipping date: 12/15/2016 EPA Region: 2

REVIEW OF EXTRACTABLE PETROLEUM HYDROCARBON (EPHs) PACKAGE

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to the data validation guidance documents in the following order of precedence METHOD FOR THE DETERMINATION OF EXTRACTABLE PETROLEUM HYDROCARBONS (VPH), Massachusetts Department of Environmental Protection, Revision 1.1 (2004). Also the general validation guidelines promulgated by the USEPA Hazardous Wastes Support Section. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) Accutest Laboratories data package received has been reviewed and the quality control and performance data summarized. The data review for SVOCs included:

Lab. Project/SDG No.: MC49177 Sample matrix: Groundwater
No. of Samples: 16
Field blank No.: MC49177-4; MC49177-12
Equipment blank No.: MC49177-2; MC49177-14
Trip blank No.: -
Field duplicate No.: MC49177-8/MC49177-9

<input checked="" type="checkbox"/> Data Completeness	<input checked="" type="checkbox"/> Laboratory Control Spikes
<input checked="" type="checkbox"/> Holding Times	<input checked="" type="checkbox"/> Field Duplicates
<input type="checkbox"/> GC/MS Tuning	<input checked="" type="checkbox"/> Calibrations
<input type="checkbox"/> Internal Standard Performance	<input checked="" type="checkbox"/> Compound Identifications
<input checked="" type="checkbox"/> Blanks	<input checked="" type="checkbox"/> Compound Quantitation
<input checked="" type="checkbox"/> Surrogate Recoveries	<input checked="" type="checkbox"/> Quantitation Limits
<input checked="" type="checkbox"/> Matrix Spike/Matrix Spike Duplicate	

Overall Comments:
Extractable_Petroleum_Hydrocarbons_by_GC_by_Method_MADEP_EPH_REV_1.1.

Definition of Qualifiers:

J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer: Rafael Defaut
Date: January 20, 2017

DATA REVIEW WORKSHEETS

All criteria were met x
Criteria were not met and/or see below

I. DATA COMPLETNESS

A. Data Package:

MISSING INFORMATION

DATE LAB. CONTACTED

DATE RECEIVED

[illegible]

B. Other

Discrepancies:

[illegible]

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of extraction, and subsequently from the time of extraction to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE EXTRACTED	DATE ANALYZED	ACTION
Samples extracted and analyzed within method recommended holding time				

Criteria

Preservation:

Aqueous samples must be acidified to a pH of 2.0 or less at the time of collection.

Soil samples must be cooled at 4 ± 2 °C immediately after collection.

Holding times:

Samples must be extracted within 14 days of collection, and analyzed within 40 days of extraction.

Cooler temperature (Criteria: 4 ± 2 °C): 3.9°C

Actions: Qualify positive results/nondetects as follows:

If holding times are exceeded, estimate positive results (J) and nondetects (UJ).

If holding times are grossly exceeded, use professional judgment to qualify data. The data reviewer may choose to estimate positive results (J) and reject nondetects (R).

If samples were not at the proper temperature ($> 10^{\circ}\text{C}$) or improperly preserved, use professional judgment to qualify the results.

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met and/or see below

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration: 12/06/16

Dates of initial calibration verification: 12/06/16

Instrument ID numbers: GCDE

Matrix/Level: AQUEOUS/MEDIUM

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, %D, r	SAMPLES AFFECTED
Initial and continuing calibration meet method specific requirements				

Criteria- ICAL

- Five point calibration curve.
- The percent relative standard deviation (%RSD) of the calibration factor must be equal to or less than 25% over the working range for the analyte of interest. When this condition is met, linearity through the origin may be assumed, and the average calibration factor is used in lieu of a calibration curve.
- A collective calibration factor must also be established for each hydrocarbon range of interest. Calculate the collective CFs for C9-C18 Aliphatic Hydrocarbons, C19-C36 Aliphatic Hydrocarbons, and C11-C22 Aromatic Hydrocarbons using the FID chromatogram. Tabulate the summation of the peak areas of all components in that fraction against the total concentration injected. The %RSD of the calibration factor must be equal to or less than 25% over the working range for the hydrocarbon range of interest.
 - The area for the surrogates must be subtracted from the area summation of the range in which they elute.
 - The areas associated with naphthalene and 2-methylnaphthalene in the aliphatic range standard must be subtracted from the uncorrected collective C9-C18 Aliphatic Hydrocarbon range area prior to calculating the CF.

Criteria- CCAL

- At a minimum, the working calibration factor must be verified on each working day, after every 20 samples or every 24 hours (whichever is more frequent), and

DATA REVIEW WORKSHEETS

at the end of the analytical sequence by the injection of a mid-level continuing calibration standard to verify instrument performance and linearity.

- If the percent difference (%D) for any analyte varies from the predicted response by more than $\pm 25\%$, a new five-point calibration must be performed for that analyte. Greater percent differences are permissible for n-nonane. If the %D for n-nonane is greater than 30, note the nonconformance in the case narrative. It should be noted that the %Ds are calculated when CFs are used for the initial calibration and percent drifts are calculated when calibration curves using linear regression are used for the initial calibration.

Actions:

If %RSD > 25% for target compounds or a correlation coefficient < 0.99, estimate positive results (J) and use professional judgment to qualify nondetects.

If % D > 25% (> 30 for nonane), estimate positive results (J) and nondetects (UJ).

CALIBRATIONS VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration: _____ 12/06/16 _____

Dates of continuing calibration verification: _____ 12/28/16; _____ 12/29/16; _____ 01/03/17 _____

Dates of final calibration verification: _____ 12/06/16; _____ 12/29/16; _____ 12/29/16; _____ 01/03/17 _____

Instrument ID numbers: _____ GCDE _____

Matrix/Level: _____ SOIL/AQUEOUS/MEDIUM _____

DATE	LAB FILE ID#	ANALYTE	CRITERIA OUT RFs, %RSD, <u>%D</u> , r	SAMPLES AFFECTED
Initial and continuing calibration meets method specific requirements except for the cases described in this document.				
12/29/16	ecc908-50	C11-C22 Aromatics	99.1	QC samples
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-1 to -10
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-11 to -14
12/29/16	cc908-50	C11-C22 Aromatics	99.1	MC49177-11 to -14

Note: Results qualified as estimated (J or UJ) in affected samples.

A separate worksheet should be filled for each initial curve

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

V A. BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data. A Laboratory Method Blank must be run after samples suspected of being highly contaminated to determine if sample carryover has occurred.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

Laboratory blanks

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
------------------	--------	------------------	----------	------------------------

 METHOD BLANKS MEET THE METHOD SPECIFIC CRITERIA

Field/Trip/Equipment

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
------------------	--------	------------------	----------	------------------------

 NO TARGET ANALYTES DETECTED IN THE FIELD/EQUIPMENT BLANK

 ANALYZED FOR THIS DATA PACKAGE.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

V B. BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. Peaks must not be detected above the Reporting Limit within the retention time window of any analyte of interest. The hydrocarbon ranges must not be detected at a concentration greater than 10% of the most stringent MCP cleanup standard. Specific actions area as follows:

If the concentration is $<$ sample quantitation limit (SQL) and $<$ AL, report the compound as not detected (U) at the SQL.

If the concentration is \geq SQL but $<$ AL, report the compound as not detected (U) at the reported concentration.

If the concentration is $>$ AL, report the concentration unqualified.

All criteria were met X
 Criteria were not met and/or see below

SURROGATE SPIKE RECOVERIES

Laboratory performance of individual samples is established by evaluation of surrogate spike recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

List the percent recoveries (%Rs) which do not meet the criteria for surrogate recovery.

Matrix: solid/aqueous

SAMPLE ID	SURROGATE COMPOUND				ACTION
	S1	S2	S3	S4	
<u> SURROGATE STANDARDS RECOVERIES WITHIN LABORATORY CONTROL </u> <u> LIMITS EXCEPT IN THE CASES DESCRIBED IN THIS DOCUMENT. </u>					

Note: 1-chlorooctadecane recovered outside the laboratory control limits in samples MC49177-1 to -9; and -12. Outside control limits due to possible matrix interference. Confirmed by refractation/reanalysis. No action taken.

S1 = o-Terphenyl 40-140%

S2 = 2-Fluorobiphenyl 40-140%

S3 = 1-Chlorooctadecane 40-140%

S4 = 2-Bromonaphthalene 40-140%

QC Limits (%)* (Aqueous)

 LL to UL 40 to 140 40 to 140 40 to 140 40 to 140

QC Limits* (Solid)

 LL to UL to to to to

It is recommended that surrogate standard recoveries be monitored and documented on a continuing basis. At a minimum, when surrogate recovery from a sample, blank, or QC sample is less than 40% or more than 140%, check calculations to locate possible errors, check the fortifying standard solution for degradation, and check changes in instrument performance.

If the cause cannot be determined, reanalyze the sample unless one of the following exceptions applies:

- (1) Obvious interference is present on the chromatogram (e.g., unresolved complex mixture);
- (2) The surrogate exhibits high recovery and associated target analytes or hydrocarbon ranges are not detected in sample.

If a sample with a surrogate recovery outside of the acceptable range is not reanalyzed based on any of these aforementioned exceptions, this information must be noted on the data report form and discussed in the Executive Report. Analysis of the sample on dilution may diminish matrix-related surrogate recovery problems. This approach can be used as long as the reporting limits to evaluate applicable MCP standards can still be achieved with the dilution. If not, reanalysis without dilution must be performed.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below _____

VII. A MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples.

At the request of the data user, and in consideration of sample matrices and data quality objectives, matrix spikes and matrix duplicates may be analyzed with every batch of 20 samples or less per matrix.

- **Matrix duplicate** - Matrix duplicates are prepared by analyzing one sample in duplicate. The purpose of the matrix duplicates is to determine the homogeneity of the sample matrix as well as analytical precision. The RPD of detected results in the matrix duplicate samples must not exceed 50 when the results are greater than 5x the reporting limit.
- The desired spiking level is 50% of the highest calibration standard. However, the total concentration in the MS (including the MS and native concentration in the unspiked sample) should not exceed 75% of the highest calibration standard in order for a proper evaluation to be performed. The purpose of the matrix spike is to determine whether the sample matrix contributes bias to the analytical results. The corrected concentrations of each analyte within the matrix spiking solution must be within 40 - 140% of the true value. Lower recoveries of n-nonane are permissible but must be noted in the narrative if <30%.

MS/MSD Recoveries and Precision Criteria

Sample ID: MC49177-3_MS/MSD Matrix/Level: Groundwater

List the %Rs, RPD of the compounds which do not meet the QC criteria.

MS OR MSD	COMPOUND	% R	RPD	QC LIMITS	ACTION

Note: MS/MSD and RPD within laboratory control limits.

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met and/or see below

No action is taken on MS/MSD results alone to qualify the entire case. However, used informed professional judgment, the data reviewer may use the MS/MSD results in conjunction with other QC criteria and determine the need for some qualification of the data. In those instances where it can be determined that the results of the MS/MSD affect only the sample spiked, the qualification should be limited to this sample alone. However, it may be determined through the MS/MSD results that the laboratory is having a systematic problem in the analysis of one or more analytes, which affects the associated samples.

2. MS/MSD – Unspiked Compounds

List the concentrations of the unspiked compounds and determine the % RSDs of these compounds in the unspiked sample, matrix spike, and matrix spike duplicate.

COMPOUND	CONCENTRATION		MSD	%RPD	ACTION
	SAMPLE	MS			

Criteria: None specified, use %RSD \leq 50 as professional judgment.

Actions:

If the % RSD > 50, qualify the results in the spiked sample as estimate (J).

If the % RSD is not calculable (NC) due to nondetect value in the sample, MS, and/or MSD, use professional judgment to qualify sample data.

A separate worksheet should be used for each MS/MSD pair.

All criteria were met X
Criteria were not met and/or see below

VIII. LABORATORY CONTROL SAMPLE (LCS/LCSD) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

List the %R of compounds which do not meet the criteria

LCS ID	COMPOUND	% R	QC LIMIT	ACTION
--------	----------	-----	----------	--------

LCS/LCSD_RECOVERY_WITHIN_LABORATORY_CONTROL_LIMITS_EXCET_FOR_
THE_CASES_DESCRIBED_IN_THIS_DOCUMENT.

Note: C9-C18 aliphatics LCS/LCS % recovery RPD outside laboratory control limits. Recovery of n-nonane was <30% for the laboratory control simple. No action taken, professional judgment.

Criteria:

- * Refer to QAPP for specific criteria.
- * The spike recovery must be between 40% and 140%. Lower recoveries of n-nonane are permissible. If the recovery of n-nonane is <30%, note the nonconformance in the executive narrative. RPD between LCS/LCSD must be < 25%.

Actions:

Actions on LCS recovery should be based on both the number of compounds that are outside the %R and RPD criteria and the magnitude of the excedance of the criteria.

If the %R of the analyte is > UL, qualify all positive results (j) for the affected analyte in the associated samples and accept nondetects.

If the %R of the analyte is < LL, qualify all positive results (j) and reject (R) nondetects for the affected analyte in the associated samples.

If more than half the compounds in the LCS are not within the required recovery criteria, qualify all positive results as (J) and reject nondetects (R) for all target analyte(s) in the associated samples.

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix (1 per 20 samples per matrix)? Yes or No.

If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected. Discuss the actions below:

DATA REVIEW WORKSHEETS

All criteria were met X
 Criteria were not met and/or see below

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs: MC49177-8/MC49177-9 Matrix: Groundwater

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which measures only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
Field duplicate analyzed with this data package. RPD within laboratory and generally acceptable control limits					

Criteria:

The project QAPP should be reviewed for project-specific information.
 RPD \pm 30% for aqueous samples, RPD \pm 50 % for solid samples if results are \geq SQL.
 If both samples and duplicate are <5 SQL, the RPD criteria is doubled.

SQL = soil quantitation limit

Actions:

If both the sample and the duplicate results are nondetects (ND), the RPD is not calculable (NC). No action is needed.

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria.

If one sample result is not detected and the other is $\geq 5x$ the SQL qualify (J/UJ).

Note: If SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is $< 5x$ the SQL, use professional judgment to determine if qualification is appropriate.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

XI. COMPOUND IDENTIFICATION

The compound identification evaluation is to verify that the laboratory correctly identified target analytes as well as tentatively identified compounds (TICs).

1. Verify that the target analytes were within the retention time windows.
 - Retention time windows must be re-established for each Target EPH Analyte each time a new GC column is installed, and must be verified and/or adjusted on a daily basis.
 - The n-nonane (n-C9) peak must be adequately resolved from the solvent front of the chromatographic run.
 - All surrogates must be adequately resolved from the Aliphatic Hydrocarbon and Aromatic Hydrocarbon standards.
 - For the purposes of this method, adequate resolution is assumed to be achieved if the height of the valley between two peaks is less than 25% of the average height of the two peaks.
 - The n-pentane (C5) and MtBE peaks must be adequately resolved from any solvent front that may be present on the FID and PID chromatograms, respectively.

- 1a. Aliphatic hydrocarbons range:
 - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for n-C9 and 0.01 minutes before the Rt for n-C19.
 - Determine the total area count for all peaks eluting 0.01 minutes before the Rt for n-C19 and 0.1 minutes after the Rt for n-C36.

Are the aliphatic hydrocarbons range properly determined? Yes? or No?

Comments:

- 1b. Aromatic hydrocarbons range:
 - Determine the total area count for all peaks eluting 0.1 minutes before the retention time (Rt) for naphthalene and 0.1 minutes after the Rt for benzo(g,h,i)perylene.
 - Determine the peak area count for the sample surrogate (OTP) and fractionation surrogate(s). Subtract these values from the collective area count value.

Are the aliphatic hydrocarbons range properly determined? Yes? or No?

Comments:

DATA REVIEW WORKSHEETS

All criteria were met X

Criteria were not met and/or see below

2. If target analytes and/or TICs were not correctly identified, request that the laboratory resubmit the corrected data.
3. Breakthrough determination - Each sample (field and QC sample) must be evaluated for potential breakthrough on a sample specific basis by evaluating the % recovery of the fractionation surrogate (2-bromonaphthalene) and on a batch basis by quantifying naphthalene and 2-methylnaphthalene in both the aliphatic and aromatic fractions of the LCS and LCSD. **If either the concentration of naphthalene or 2-methylnaphthalene in the aliphatic fraction exceeds 5% of the total concentration for naphthalene or 2-methylnaphthalene in the LCS or LCSD, fractionation must be repeated on all archived batch extracts.**

NOTE: The total concentration of naphthalene or 2-methylnaphthalene in the LCS/LCSD pair includes the summation of the concentration detected in the aliphatic fraction and the concentration detected in the aromatic fraction.

Comments: Concentration in the aliphatic fraction < 5% of the total
concentration for naphthalene and 2-methylnaphthalene

4. **Fractionation Check Standard** – A fractionation check solution is prepared containing 14 alkanes and 17 PAHs at a nominal concentration of 200 ng/μl of each constituent. The Fractionation Check Solution must be used to evaluate the fractionation efficiency of each new lot of silica gel/cartridges, and establish the optimum hexane volume required to efficiently elute aliphatic hydrocarbons while not allowing significant aromatic hydrocarbon breakthrough. For each analyte contained in the fractionation check solution, excluding n-nonane, the Percent Recovery must be between 40 and 140%. A 30% Recovery is acceptable for n-nonane.

Is a fractionation check standard analyzed?

Yes? or No?

Comments: Not applicable.

DATA REVIEW WORKSHEETS

All criteria were met X
Criteria were not met and/or see below

XII. QUANTITATION LIMITS AND SAMPLE RESULTS

The sample quantitation evaluation is to verify laboratory quantitation results.

In order to demonstrate the absence of aliphatic mass discrimination, the response ratio of C28 to C20 must be at least 0.85. If <0.85, this nonconformance must be noted in the laboratory case narrative.

The chromatograms of Continuing Calibration Standards for aromatics must be reviewed to ensure that there are no obvious signs of mass discrimination.

Is aliphatic mass discrimination observed in the sample? Yes? or No?

Is aromatic mass discrimination observed in the sample? Yes? or No?

1. In the space below, please show a minimum of one sample calculation:

MC49177-1 EPH (C11 – C22, Aromatics) RF = 99940

[] = (2313350)/(99940)

[] = 23.14 ppb Ok

 EPH (C19 - C36, Aliphatics) RF = 67800

[] = (2264689)/(67800)

[] = 33.40 ppb Ok

DATA REVIEW WORKSHEETS

2. If requested, verify that the results were above the laboratory method detection limit (MDLs).
3. If dilutions performed, were the SQLs elevated accordingly by the laboratory? List the affected samples and dilution factor in the table below.

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION

If dilution was not performed, estimate results (J) for the affected compounds. List the affected samples/compounds:
